Jiro TANAKA* and Mitsuo CHIHARA*: Taxonomic study of the Japanese crustose brown algae (4) *Ralfsia* (Ralfsiaceae, Ralfsiales) (Part 3)**

田中次郎*・千原光雄*: 日本産殻状褐藻の分類学的研究（4）イソガワラ属 (第3部)

7) **Ralfsia endopluroides** sp. nov.

Thalli crustacei expansi, epilithici, initio circulares, postea ambitu indefiniti aut irregulares, atrobrunnei, usque ad 1.5 cm. diam., 150-300 μm crassi in partibus fructiferis maturis, saepe concrescentes, substrato sine rhizoideis firme affixi; pars basis 1-2 cellulo-stratosa; filamenta erecta 5-9 μm crassa, sursum leviter curvata; chloroplastus 1 per cellulam; sporangia unilocularia pyriformia, clavata aut obovata, 45-60(-70) μm longa, 13-25 μm crassa, sessilia; paraphyses longe clavatae, 80-95 μm longae, e 6-8 cellulis compositae; organa reproductiva plurilocularia 2 seriata, 40-55 μm longa, cum 3 cellulis sterilibus praedita.

Thallus crustose, expanded, epilithic, dark brown, circular in outline when young, later indefinite or irregular, 150-300 μm thick in mature thalli, attaining up to 1.5 cm, often confluent and covering the upper surface of a pebble, firmly attached to the substratum without rhizoids; the surface of the thallus smooth in all stages; a thin basal layer composed of 1-2 rows of cells, which are 8-11 μm in height and 2-3 times as broad as high; erect filaments ascending from a basal layer, slightly curving upwards, adjoined with each other to form a pseudoparenchymatous tissue, somewhat tapering toward the surface, cells of the erect filament 6-9 μm broad and 1.0-1.8 times as long as wide in the lower part, 5-6 μm broad and 0.8-1.2 times as long as wide in the upper part; hairs in tufts, arising from the lower part of the thallus; chloroplast single, plate-shaped, adherring to the upper cell wall; cell sometimes filled with a perforated plate-shaped storage substance; reproductive sori small; both unilocular sporangia and plurilocular reproductive organs borne on the same thallus; unilocular

---

* Institute of Biological Sciences, The University of Tsukuba, Sakura-mura, Ibaraki-ken 305. 筑波大学, 生物科学系.

** Continued from Journ. Jap. Bot., **55**: 337-342 (1980). Contributions from the Shimoda Marine Research Center, no. 375.

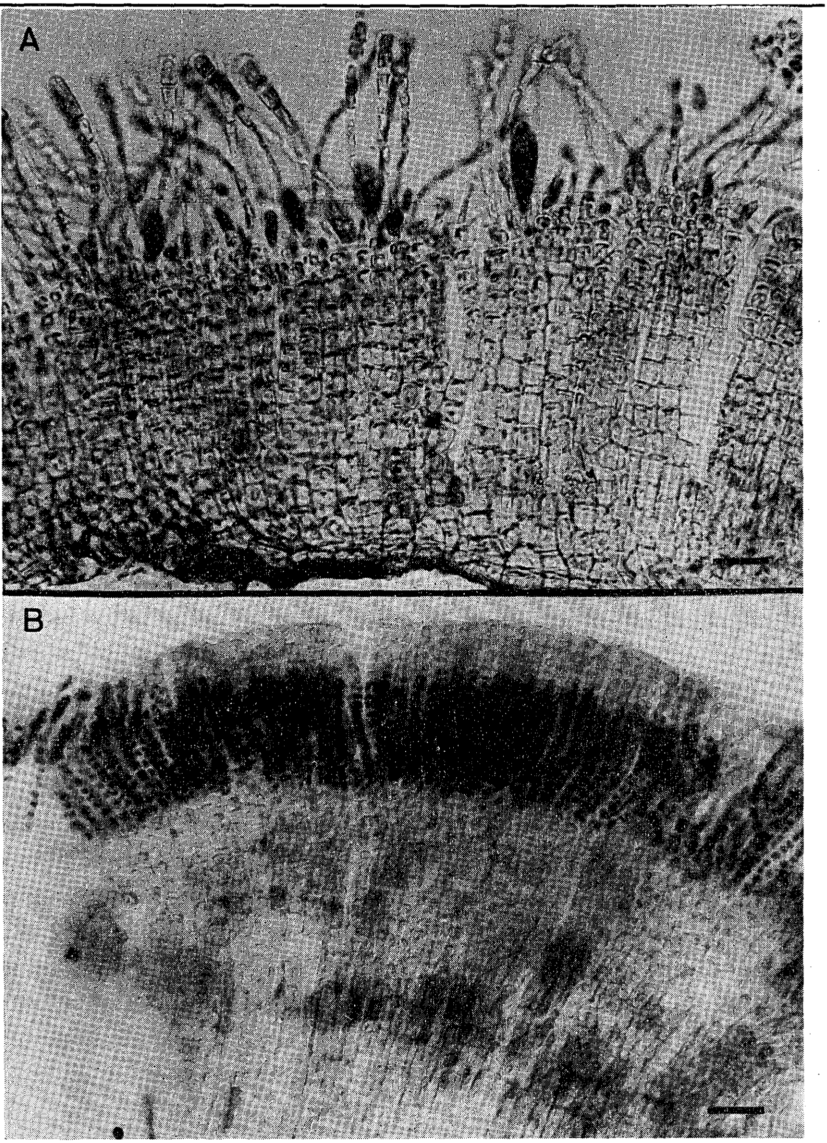

Fig. 1. *Ralfsia endopluroides*. A. Longitudinal section of the thallus with unilocular sporangia. B. Cross section of the thallus with plurilocular reproductive organs. Scale = 20 μm.

sporangia pyriform, clavate or obovoid, 45-60(-70) μm long and 13-25 μm broad in mature, arising from the supporting cells of paraphyses; paraphyses long clavate, composed of 6-8 cells, 80-95 μm long, having terminal cells about 6 μm broad and 12 μm long, basal cells 3 μm broad and 16 μm long; plurilocular reproductive organs arising from a cell located in the subterminal part of erect filaments, composed of two parallel rows of plurilocular reproductive filaments with three sterile cells in piles on the top, 40-55 μm long when mature; sterile cells about 4 μm broad and the same length.

Habitat: Growing on pebbles or on rocks in the intertidal zone.

Holotype: Kesennuma, Miyagi-ken, Oct. 28, 1977 (TKB-1332, in liquid).

Representative specimens examined: Kesennuma, Miyagi-ken, Apr. 25, 1978 (TKB-1333); the same, Nov. 1979 (TKB-1334).

This new species is characterized by having erect filaments firmly joined with one another and sometimes curving upwards, plurilocular reproductive organs bearing three terminal sterile cells and unilocular sporangia bearing no stalked cell.

Superficially, this species is similar to species of *Pseudolithoderma,* because the thallus is nearly black in color and thin. However, it is revealed to have a single and plate-shaped chloroplast in the cell, a feature characteristic of *Ralfsia.* Morphological features of the plurilocular reproductive organs of this alga are fundamentally identical with those of *Endoplura aurea.* The organs are intercalarly and bear three terminal sterile cells. On the basis of the presence of a single chloroplast per cell, the three terminal sterile cells on the plurilocular reproductive organ, and the sessile unilocular sporangia, it is best at present to recognize this alga as a new species. We, therefore, propose to give it a binomial *Ralfsia endopluroides* after its similarity to a species of *Endoplura* in the morphology of the plurilocular reproductive organ.

One of the other characteristic features of *R. endopluroides* is the position of unilocular and plurilocular reproductive organs, both being located fairly close together on the same thallus. According to Hollenberg (1969, p. 291), one of the features characterizing *Ralfsia* is the occurrence of two kinds of reproductive organs on separate thalli. If we follow this circumscription, the present species should be excluded from *Ralfsia.* As described in our previous paper (1980), *Ralfsia expansa* also bears both kinds of reproductive organs on the same thallus. *Ralfsia expansa* and *R. endopluroides* are included in that

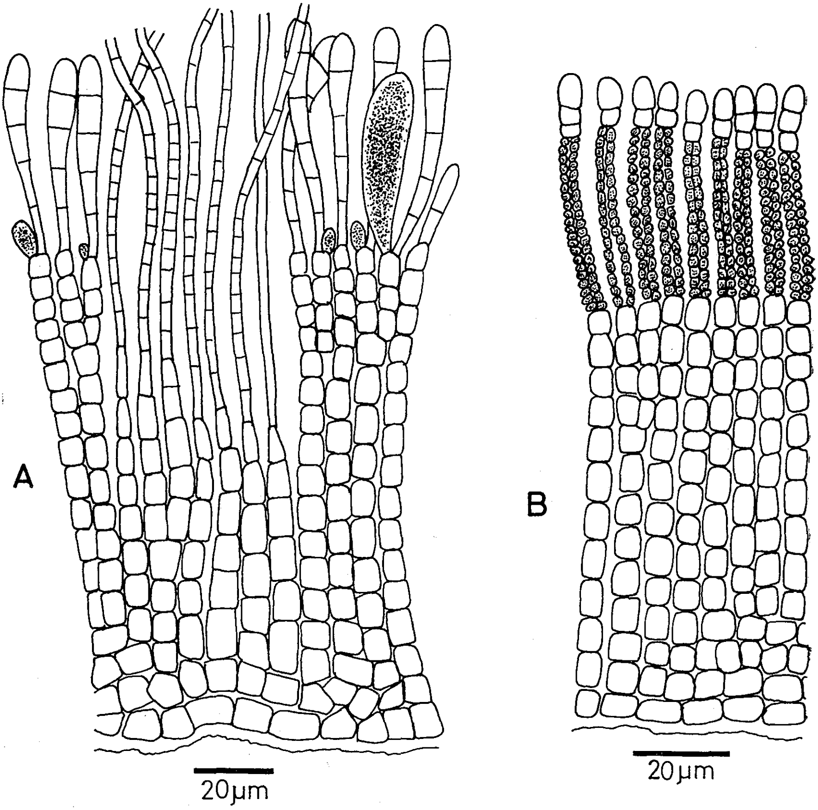

Fig. 2. *Ralfsia endopluroides.* A. Longitudinal section of the thallus with unilocular sporangia, showing mature and immature sporangia, paraphyses and hairs. B. Cross section of the thallus with plurilocular reproductive organs, showing plurilocular reproductive filaments and sterile cells on them.

genus because of their vegetative structural characteristics. Because of the presence of both unilocular and plurilocular reproductive organs on the same thalli in these species, diagnosis of the genus *Ralfsia* is changed to include this character as possible in some species.

8) **Ralfsia pedicellata** sp. nov.

Thalli crustacei, pallide brunnei aut brunnei, 0.3-2.5 cm. lati, 210-240 µm crassi in partibus fructiferis maturis; stratum basis 1-4 stromaticum; fila erecta 5-7 µm crassa, e 10-18 cellulis composita; chloroplastus 1 per cellulam; sporangia

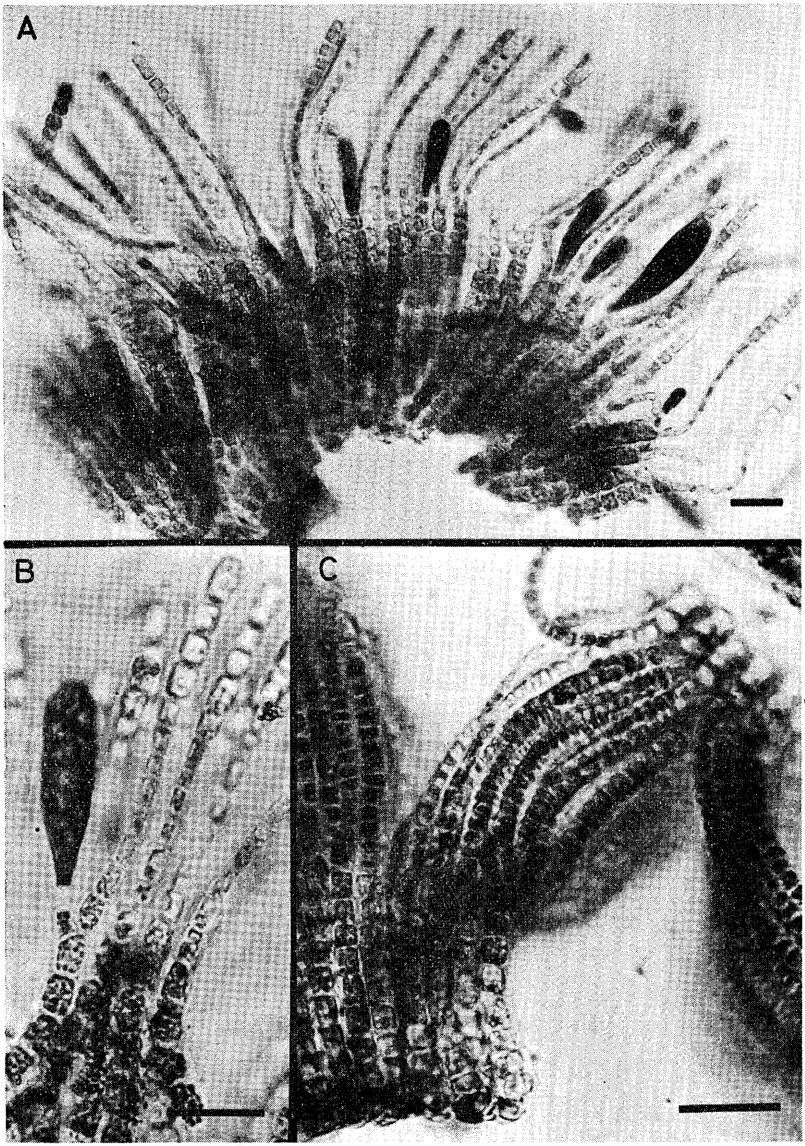

Fig. 3. *Ralfsia pedicellata*. A. Longitudinal section of the thallus with unilocular sporangia. B. Unilocular sporangium, stalk cell and paraphyses. C. Cross section of the thallus with plurilocular reproductive organs. Scale = 20 μm.

unilocularia obovata aut elliptica, 40-50(-65) μm longa et 14-18(-20) μm crassa, pedicellata, cum 1 petiole-cellula; paraphyses 80-110 μm longae, 5-7 μm diam., e 11-18 cellulis compositae; organa reproductiva plurilocularia in positionibus infossis formata, 35-60(-75) μm longa, cum 2 cellulis sterilibus.

Thallus thin crustose, expanded, epilithic, light brown or brown, at first circular in outline, later becoming irregular, 0.3-2.5 cm in diameter, 100-120 μm thick in vegetative thallus, 210-240 μm thick in mature thallus, firmly attached to the substratum with the under surface without rhizoids; a basal layer composed of 1-4 rows of cells; erect filaments arising from the basal layer, composed of 10-18 cells, simple or sometimes branched, loosely united with each other to form a pseudoparenchymatous tissue, slightly tapering toward the surface; cells of erect filament 5-6 μm broad and 1-1.3 times as long as wide; tuft of hairs arising from a basal layer; chloroplast single plate-shaped or irregular in shape; reproductive sori scattered over the entire surface; unilocular sporangia and plurilocular reproductive organs borne on the separate thalli; unilocular sporangia obovate to elliptical, 40-50(-65) μm long and 14-18 μm broad, always with one small (about 5 μm diam.) stalk cell, arising subterminally from the terminal cell of erect filaments; paraphyses long clavate, composed of 11-18 cells, 80-110 μm long, terminal cells 5-7 μm broad and 1.2-1.6 times as long as broad, basal cell 3-4 μm broad and 1.2-2.1 times as long as wide; plurilocular reproductive organs 35-60(-75) μm long, arising from a subterminal cell of the erect filament, forming two separate or united parallel plurilocular reproductive filaments, associated with two terminal sterile cells.

Habitat: Growing mixed with *Mesospora schmidtii* on rocks in the upper and the middle intertidal zone, especially in exposed surf areas.

Holotype: Sani, Amami-osima, Kagoshima-ken, Mar. 26, 1978 (TKB-1335, in liquid).

Representative specimens examined: Amami-oshima, Kagoshima-ken, Mar. 25, 1978 (TKB-1336).

This species is characterized by having pedicellate unilocular sporangia with a one-celled small stalk and by having plurilocular reproductive organs which are arranged in two rows throughout, each bearing two terminal sterile cells.

Among known species of *Ralfsia*, only two species have plurilocular reproductive organs bearing more than one sterile terminal cell: *R. fungiformis* has three to six sterile terminal cells (Tokida, 1954) and *R. endopluroides* has

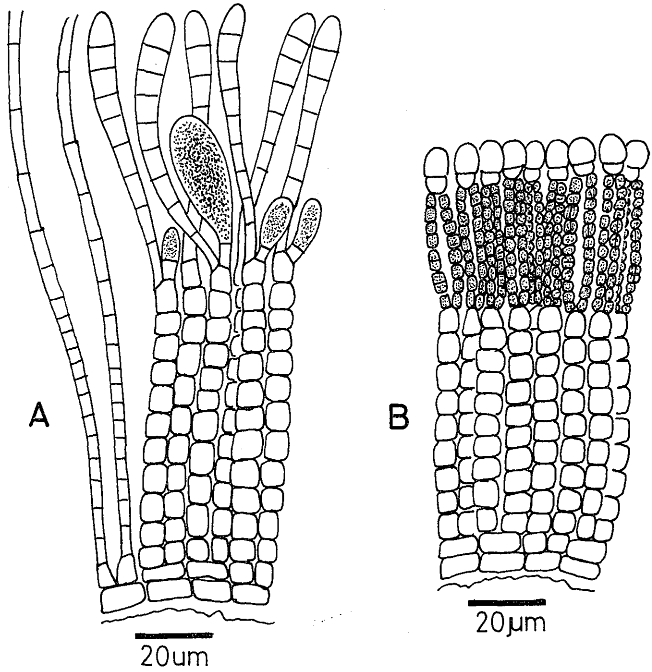

Fig. 4. *Ralfsia pedicellata.* A. Longitudinal section of the thallus with unilocular sporangia, showing mature and immature sporangia, stalk cells, paraphyses and hairs. B. Cross section of the thallus with plurilocular reproductive organs, showing plurilocular reproductive filaments and sterile cells.

three sterile terminal cells, as described in this paper. There has been no described species which has two sterile terminal cells on the plurilocular reproductive organ, as the present species does. Another characteristic feature of this new species is the morphology of the unilocular sporangia: the unilocular sporangia always bear a one-celled stalk. So far as is known, there are three species known to have a one-celled stalk; *R. verrucosa, R. expansa* and *R. confusa.* However, it should be noticed that the sporangia of *R. verrucosa* are mostly sessile and rarely have a one-celled stalk, and those of *R. expansa* and *R. confusa* are usually stalked with several cells and have rarely a one-celled stalk. *R. confusa* Hollenberg (1969) comes closest to the present alga. However, it differs from ours by having unilocular sporangia with usually several cells in the stalk as mentioned above, and by having plurilocular reproductive organs

being mostly uniseriate with a single sterile terminal cell.

References

Hollenberg, G. J. 1969. An account of the Ralfsiaceae (Phaeophyta) of California. J. Phycol. **5**: 290-301. Tanaka, J. and M. Chihara 1980. Taxonomic study of the Japanese crustose brown algae (2) *Ralfsia* (Ralfsiaceae, Ralfsiales) (Part 1). Journ. Jap. Bot., **55**: 225-236. Tokida, J. 1954. The marine algae of southern Saghalien. Mem. Fac. Fish. Hokkaido Univ. **2**: 1-264.

* * * *

本報告ではイソガワラ属 (*Ralfsia*) の2種を新種として記載した。

Ralfsia endopluroides J. Tanaka et Chihara sp. nov. は直径約1 cm のうすい体 (150-300 μm) で，暗褐色の斑紋として岩や石の上に生育する。単子嚢に柄細胞がないこと及び複室生殖器官の形態がこの新種の種小名が由来した *Endoplura* Hollenberg 属の性質に似ており，かつ複室生殖糸 (plurilocular reproductive filament) の上部に縦に3個並んだ不稔細胞列があることで近似の種と区別できる。宮城県気仙沼産。

Ralfsia pedicellata J. Tanaka et Chihara sp. nov. は直径1～2 cm のかなりうすい体 (100～120 μm) で，明るい褐色または褐色を呈する。カリフォルニア産の *Ralfsia confusa* Hollenberg に似るが，次の形質の組合せにより識別できる。1) 単子嚢は1細胞からなる柄をもつ，2) 複室生殖糸の上部に縦に2個並んだ不稔細胞列をもつ。奄美大島佐仁産。

□ Dibben, Martyn J.: **The chemosystematics of the lichen genus *Pertusaria* in North America North of Mexico.** 162 pp. 1980. Milwaukee Public Museum. 固着地衣の研究が遅れているのはアメリカでも日本と同様である。本書は北米産の *Pertusaria* (トリハダゴケ属) の地衣66種についての，著者の学位論文をもとにしたモノグラフである。日本産の *Pertusaria* については生塩，四分一両君の研究があって一歩先んじてはいるが，これらの見直しのためにも，本書は大いに役立つものと期待される。しかし，形態や地衣成分を特徴とする種の扱い方は，どちらかと言えば保守的であるし，また著者が採用した2亜属 (Subgen. *Pertusaria* と Subgen. *Pionospora*) に分類するやり方も，従来の考えを出るものではない。こうした点は兎も角として，北米産の66種について，形態，分布，化学成分等を丹念に調べてまとめた功績は大きく，これからの固着地衣の研究のための指針となるであろう。 (黒川　逍)